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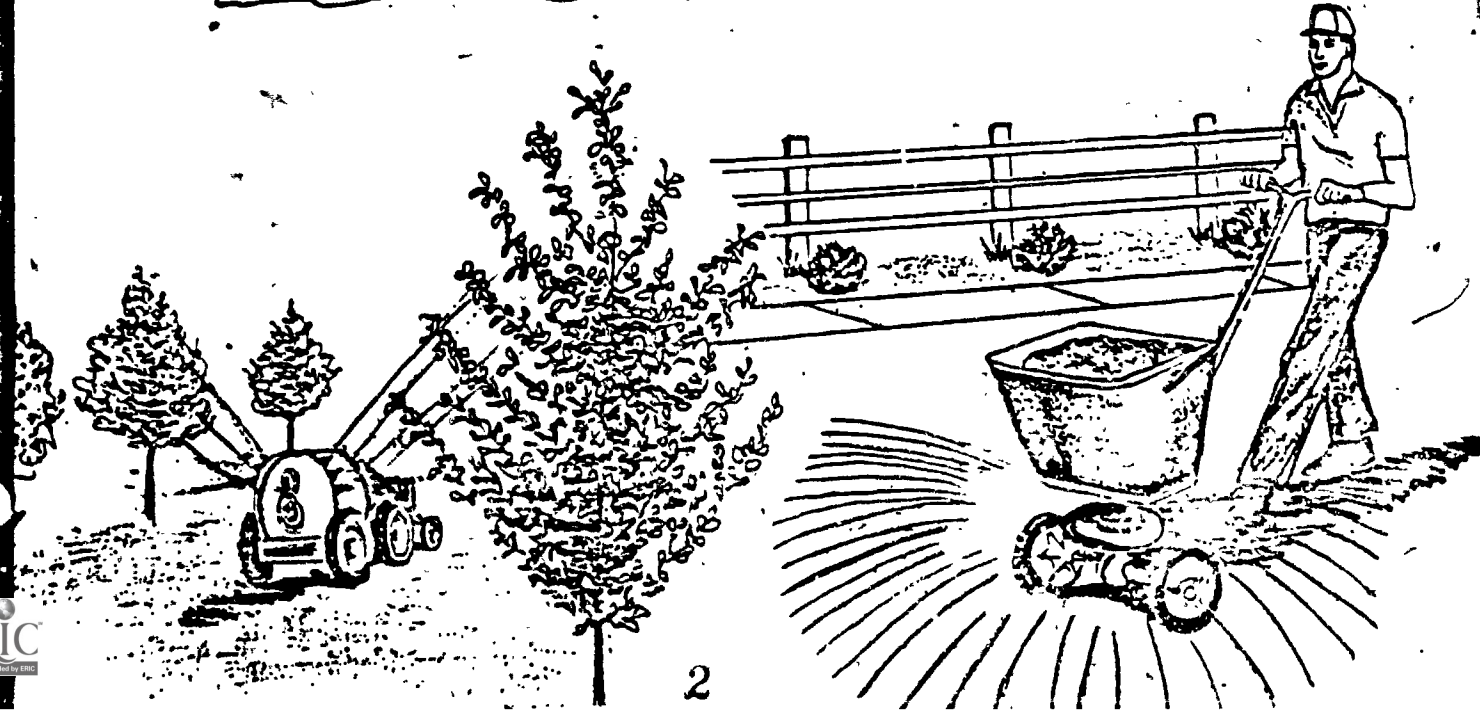
ABSTRACT

This competency-based curriculum unit on turf identification is one of four developed for classroom use in teaching the turf and lawn services area of horticulture. The three sections are each divided into teaching content (in a question-and-answer format) and student skills that outline steps and factors for consideration. Topics covered include identifying turfgrasses, identifying turf samples, and selecting proper turfgrass for specific sites. A list of references precedes a section containing visual aids, student skill checklist, and student activities, such as handouts, discussion activities, field trips, crossword puzzles, hands-on experiences, worksheets, tests, and quizzes. Answer keys are provided. (YLB)

Turf Identification

Competency Based Teaching Materials in Horticulture



Listed below are competency based curriculum units developed for classroom use in teaching horticulture. All units are indexed and include teaching content, references, student activities, a skill check list, and visual aids.

LANDSCAPE/NURSERY Tree Identification Developing a Landscape Plan Implementing the Landscape Plan Maintaining the Landscape Nursery Propagation	GREENHOUSE PRODUCTION & MANAGEMENT Controlling the Greenhouse Environment Greenhouse Soils Foliage Plants Propagation Sales Cut Flower Production Bedding Plants
TURF AND LAWN SERVICES Identification of Turf Grasses Soils and Fertilizers Planting Turf Grasses Insects and Diseases	VEGETABLE PRODUCTION Identification of Cool Season Vegetables Identification of Warm Season Vegetables Vegetable Production Insects, Diseases, and Weeds
FRUIT PRODUCTION (In progress)	

ACKNOWLEDGEMENT

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TURF IDENTIFICATION

Contents

Turf Identification

IDENTIFY TURFGRASSES

Teaching content: 11 questions; 3 student skills

Question 1 What morphological structures are associated with turfgrasses?

- Leaf blade--upper flattened, green portion
- Leaf sheath--lower tubular portion encircling stem
- Ligule - tongue-like outgrowth in collar area; may be:
  a) fringe of hairs
  b) smooth membrane
  c) jagged membrane
- Auricle--pair of appendages, projecting from collar; may be:
  a) long and slender
  b) short and stubby
  c) absent
- Collar--area of junction between leaf blade and sheath; may be:
  a) continuous
  b) divided
- Rhizomes--having underground, horizontal, elongated stems
- Stolons--having aboveground, horizontal, elongated stems

*A/V

Student Skill 1

IDENTIFY TURFGRASS MORPHOLOGICAL FEATURES

Steps	Factors for Consideration
1. Locate: leaf blade and sheath	1. Ligule and/or auricles may be absent
2. Then locate: collar area, ligule, auricles	2. Hand lens is helpful

*A/V

Question 2 What hand lens magnification power is necessary for turfgrass identification study?

- 5x-Power
- 10x-Power

Student Skill 2

USE HAND LENS

Steps

1. A 5x and 10x power hand lens will be used to examine the samples more closely.
2. The hand lens is composed of two 5x power lens that are easily combined to produce 10x power magnification.
3. Hold the hand lens over a turfgrass sample and bring into focus by moving the lens closer to or farther from the sample.

Question 3 What are the major types of turfgrasses used in the midwest?

- Bluegrass
- Bentgrass
- Ryegrass
- Fescue
- Bermudagrass
- Zoysiagrass
- St. Augustinegrass

Question 4 What species of bluegrass is most commonly found in the cool season turf belt?

- Kentucky Bluegrass (Poa pratensis)
- Annual Bluegrass (Poa annua)
- Rough Bluegrass (Poa trivialis)

Question 5 What species of bentgrass are most commonly found in the cool season turf belt?

- Creeping Bentgrass (Agrostis palustris)
- Redtop (Agrostis alba)

Question 6 What species of ryegrass are most commonly found in the cool season turf belt?

- Perennial Ryegrass (Lolium perenne)
- Annual Ryegrass (Lolium multiflorum)

Question 7 What species of fescue are most commonly found in the cool season turf belt?

- Red Fescue (Festuca rubra)
- Tall Fescue (Festuca arundinacea)

Question 8 What turfgrass species is found in the warm season turf belt?

- Bermudagrass (Cynodon dactylon)

Question 9 What species of Zoysiagrass is most commonly found in the warm season turf belt?

- Zoysia (Zoysia japonica)

Question 10 How can each of the seven major turfgrasses be identified?

- Poa pratensis - Kentucky bluegrass
  - boat-shaped leaf tip
  - absence of auricles
  - membranous ligule
  - folded vernation

- Agrostis palustris - Creeping bentgrass
  - long, rounded, membranous ligule
  - stoloniferous
  - leaf blade thin (2-3 mm)
  - rolled vernation

- Lolium perenne - Perennial ryegrass
  - pointed, membranous ligule
  - short, non-clasping auricles
  - folded vernation

- Festuca rubra - Red fescue
  - narrow leaves (3-5 mm)
  - rhizomes
  - folded or flat leaves
  - folded vernation

- Festuca arundinacea - Tall fescue
  - wide, coarse leaf blade (12 mm)
  - clump-like growth habit
  - short, stubby auricles
  - distinctly green color as compared to dark leaf blade
  - rolled vernation

- Cynodon dactylon - Bermudagrass
  - ligule is a fringe of hairs
  - long hairs extending from collar
  - smooth leaf blade with short hairs
  - both stolons and rhizomes present

- Zoysia japonica - Zoysiagrass
  - ligule is fringe of hairs
  - long hairs extending from collar
  - smooth leaf blade with long, slender hairs extending from upper side
  - both stolons and rhizomes present
  - rolled vernation

- Stenotaphrum secundatum - St. Augustinegrass
  - ligule is a fringe of hairs
  - folded vernation
  - auricles absent
  - stoloniferous
  - coarse textured

Student Skill 3

IDENTIFY TURFGRASSES BY COMMON AND SCIENTIFIC NAME	
Steps	**Factors for Consideration**
1. Use above morphological features to determine this	1. Use as many features as possible, not just one

*A/V

Question 11 What are the cultural requirements of each turfgrass?

- Kentucky bluegrass - Poa pratensis
  - sun
  - moderate to high fertilization; 2-6# N/1000 ft^2/yr. and higher if clippings removed
  - 1 1/2-2" mowing height
  - must have supplemental irrigation during dry periods

  Kentucky bluegrass is the principal turf used in the cool season belt and is adapted to a wide range of environmental conditions. It is most frequently used for homeowner lawns.

- Creeping bentgrass - Agrostis palustris
  - sun
  - high fertilization; 4-8# N/1000 ft^2/yr.
  - 1/4" or less mowing height
  - frequent irrigation

  Creeping bentgrass is suited for golf course greens or other closely mowed areas. It is not suited for home lawns as a high level of cultural care is needed.

- Perennial ryegrass - Lolium perenne
  - sun
  - moderate fertilization; 2-6# N/1000 ft^2/yr.
  - 2-2 1/2" mowing height
  - frequent irrigation

  Perennial ryegrass is used in the establishment of lawns since it is fast to germinate from seed and is a vigorous grower. In general, it is intolerable of temperature extremes and dry situations.

- Red fescue - Festuca rubra
  - shade
  - low to moderate fertilization; 2# N or less/1000 ft^2/yr.
  - 2-2 1/2" mowing height
  - little supplemental irrigation needed

  Red fescue is best suited for shady, cool areas.

- Tall fescue - Festuca arundinacea
  - sun or moderate shade
  - low level of fertilization; minimal (1-2# N/1000 ft^2/yr.) in spring only
  - 1 1/2-3" mowing height
  - no supplemental irrigation

  Tall fescue is best adapted to low maintenance areas such as parks, playgrounds, roadways, etc. It tolerates heat and drought quite well; coarse--should be planted alone in lawn.

- Bermudagrass - Cynodon dactylon
  - full sun
  - low fertilization; 0.5-2# N/1000 ft^2/yr.
  - 1/2-1" mowing height

  Bermudagrass grows best in warm, humid and warm, semi-arid regions. It may be used on lawns, institutional grounds, parks, roadsides, fairways, golf greens and tees, air fields and athletic fields. Heat and drought tolerant; coarse texture and tends to clump in lawn.

- Zoysiagrass - Zoysia japonica
  - sun
  - moderate fertilization; 1.5-3.0# N/1000 ft^2/yr.
  - 3/4-1" mowing height (prevents thatch buildup)
  - irrigation beneficial, not a necessity

  Zoysiagrass may be used for lawns in transition zone; can also be used on playgrounds, tees, fairways, air fields, and as buffer strips between bentgrass and Bermudagrass fairways.

- St. Augustinegrass - Stenotaphrum secundatum
  - sun
  - moderate fertilization; 2-4# N/1000 ft^2/yr.
  - 1-2 1/2" mowing height
  - irrigation needed during drought

IDENTIFY TURF SAMPLES

Teaching content: 2 questions; 7 student skills

Question 1 What is the use of a turfgrass plugger?

- Remove plugs of turfgrass for identification.

Student Skill 1

OPERATE PLUGGER

Steps	Factors for Consideration
1. Set plugger firmly on selected area of sample	1. Soil should be slightly moist to hold sample firmly together
2. Force plugger into soil using foot pressure	
3. Give slight twist to plugger handle to loosen sample plug	
4. Lift plugger from soil with sample in the plugger	
5. Remove the sample by pressing the plug from the plugger	5. Be careful not to break plug apart by pressing too hard in one spot

Student Skill 2

COLLECT SAMPLES

Steps	Factors for Consideration
1. Select types of turfgrasses to be collected	1. Select turfgrasses that are adaptable to particular area of intended study (i.e., the midwest)
2. Take sample plugs from established healthy stands of positively identified turfgrasses	- Bluegrasses - Bentgrasses Ryegrasses - Fescues - Bermudagrasses - Zoysiagrasses

Question 2 What constitutes a root, stem and leaf to determine a whole plant?

- Plant's root systems will be grown together. Differentiate between a plant's rhizome or stolon and its root system.
- Plant's stems (e.g. rhizomes and stolons) will be massed together. Turfgrass plant's stem may be either or both above ground and below ground.
- Plant's leaves may be intertwined. Different types of turfgrasses have varying leaf habits which become intertwined.

Student Skill 3

DIVIDE PLANTS

Steps	Factors for Consideration
1. Carefully separate individual turfgrass plants from sample plugs	
2. The separated plants must consist of whole plants composed of roots, stems and leaves	
3. Lay identified plants from each of samples in a row next to each other	3. Individual plants separated from sample must be representative of type of turfgrass from which plant speciman is identified.

Student Skill 4

COMPARE SAMPLES

Steps	Factors for Consideration
1. Set samples of turfgrasses on a table in an organized fashion with positive identification for each sample	
2. With the aid of a hand lens, examine roots, stems, and leaves of turfgrass samples	2. Terms in glossary referring to turfgrass structural parts are to be pointed out on samples
3. Study differences among individual plants with respect to their roots, stems and leaves	

Student Skill 5

LOCATE AND COMPARE PHYSICAL DIFFERENCES

Steps		Factors for Consideration
1. Auricle	7. Panicle	- Not all samples will exhibit all listed plant parts
2. Collar	8. Petiole	- The stage of turfgrass plant development and maturity of plant will have bearing on appearance of physical structure of plant
3. Crown	9. Sheath	
4. Inflorescense		
5. Ligule	10. Spike	
6. Node	11. Spikelet	
	12. Stem	

Student Skill 6

LOCATE AND COMPARE GROWTH PATTERN DIFFERENCES

Steps		Factors for Consideration
1. Alternate	4. Rhizome	- The stage of development and maturity of turfgrass plant will have bearing on some growth pattern appearances
2. Opposite	5. Stolon	
3. Whorled	6. Tiller	

Student Skill 7

COMPARE LEAF SHAPE DIFFERENCES

Steps	Factors for Consideration
1. Blade	- Maturity and developmental stage of plant will influence leaf appearance
2. Leaflet	
3. Leaf color	- Leaf color is influenced by environmental variances
4. Midrib	
5. Vein	

SELECT PROPER TURFGRASS FOR SPECIFIC SITES

Teaching content: 3 questions; 2 student skills

Question 1 What features of the site must be considered?

- Light (sun or shade)
- Fertilization
- Mowing height
- Supplemental irrigation

Question 2 What turfgrass types are best for specific uses?

Alternatives	Factors for Consideration
1. Adaptability of site	- Analyze requirements necessary for specific use
2. Availability of time & effort for maintenance	- Analyze plus and minus factors of each of studied turfgrasses
3. Affordability	- Evaluate proposed time and effort that is to be allocated for a turfgrass maintenance program
	- Determine cost factor for establishing turfgrass and cost of maintaining established turf

Question 3 Which turf should be selected for a specific site?

Alternatives	Factors for Consideration
1. Cool season - Kentucky bluegrass - Red fescue - Tall fescue - Perennial ryegrass - Creeping bentgrass 2. Warm season - Zoysiagrass - Bermudagrass - St. Augustinegrass	- Light condition - Soil conditi - Fertilization - Mowing height - Supplemental irrigation

Student Skill 1

NAME A TURFGRASS FOR A SPECIFIC SITE

Steps	Factors for Consideration
1. Analyze site environment (light and soil conditions) 2. Consider cultural requirements (fertilization, mowing height and irrigation) 3. Select proper turfgrass	1. For additional yearly recommendations, refer to University of Illinois Circular 1082 "Illinois Lawn Care and Establishment"

Student Skill 2

SELECT TURFGRASSES

Steps	Factors for Consideration
1. List specific uses for turfgrasses (e.g., golf course: green, tees, fairways, roughs; institutional grounds; lawns; athletic fields, cemeteries; etc. 2. Identify special requirements needed of turfgrasses in these specific uses 3. List specific growing requirements and particular tolerances and assets of studied turfgrasses 4. Select turfgrass type that best fulfills requirements of specified use	2. Special requirements would be mowing heights tolerance, shade or full sun, moisture requirements or tolerances, adaptability to abuse, etc.

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STUDENT ACTIVITIES

TURFGRASS IDENTIFICATION

Glossary

Asexual - Plant propagation through the use of a vegetative part or parts--the root, stem, and/or leaf.

Annual, summer - Plant which completes its life cycle from seed in one growing season.

Annual, winter - Plant that initiates growth in the fall, lives over winter, and dies after producing seed the following season.

Auricle - Claw-like appendages occurring in pairs at the base of the leaf blade.

Axil - Upper angle between leaf and stem.

Blade - The flattened portion of the leaf located above the sheath.

Collar - The light-colored band at the junction of the leaf blade and the sheath.

Cool-season grass - Turf species adapted to favorable growth during cool portions (60°-75°F) of the growing season.

Crown - The fleshy lump of stems located just above or below ground level.

Inflorescense - The flowering portion of the shoot leaf.

Leaflet - Blade of a compound leaf.

Ligule - Membranous or hairy projection at the junction of the blade and leaf.

Midrib - Central vein of the leaf.

Node - The joint of a stem; the region of attachment of leaves to a stem.

Panicle - Type of inflorescense in which the spikelets are not directly attached to the main axis.

Pedicle - The stalk of a single grass floret.

Perennial - Plant which lives more than two years.

Petiole - Stalk of a leaf.

Plugging - To propagate turfgrasses vegetatively by means of plugs or small pieces of sod.

Rhizome - Underground horizontal stems that are able to develop roots or shoots at any node.

Sheath - The tubular, basal portion of the leaf that encloses the stem.

Spike - Inflorescense with flowers attached directly to unbranched stem.

Spikelet - The basic unit of inflorescense for grasses and sedges with one or more flowers between two glumes.

Sprigging - Vegetative planting by placing stolons or rhizomes in small holes.

Stem - Part that supports flowers or leaves.

Stolon - Stems that grow horizontally above the ground. Roots and shoots develop from any node that touches the ground.

Taproot - System where the primary root becomes the main root of the plant.

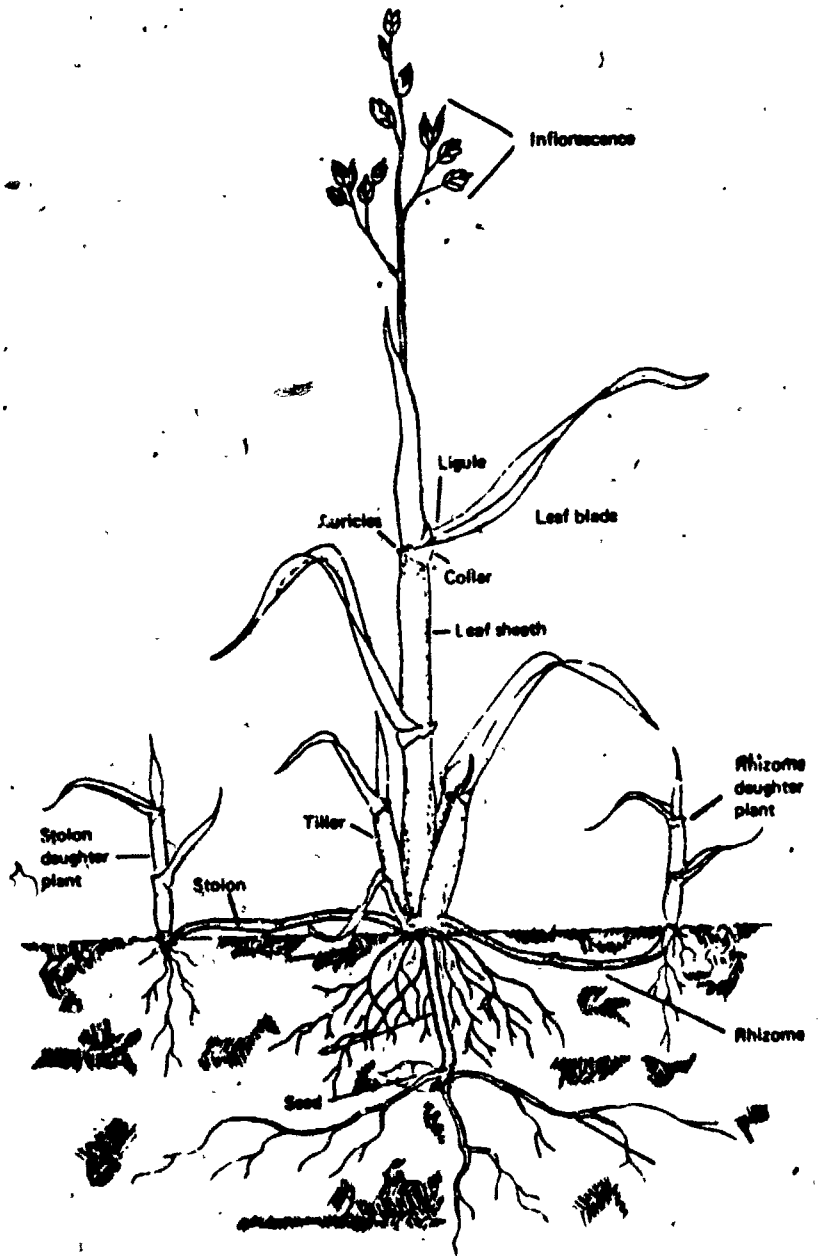
Tiller - A newly developed turfgrass shoot.

Vegetative propagation - Asexual propagation using pieces of vegetation, either sprigs or sod pieces.

Warm-season grass - Turf species adapted to favorable growth during warm portions (80-95°F) of the growing season.

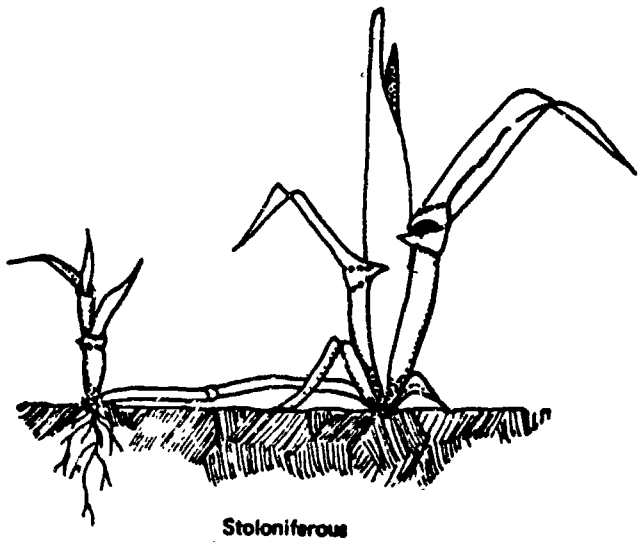
Whorled - Arrangement of three or more leaves in a circle around a stem.

DIAGRAM OF A GRASSPLANT

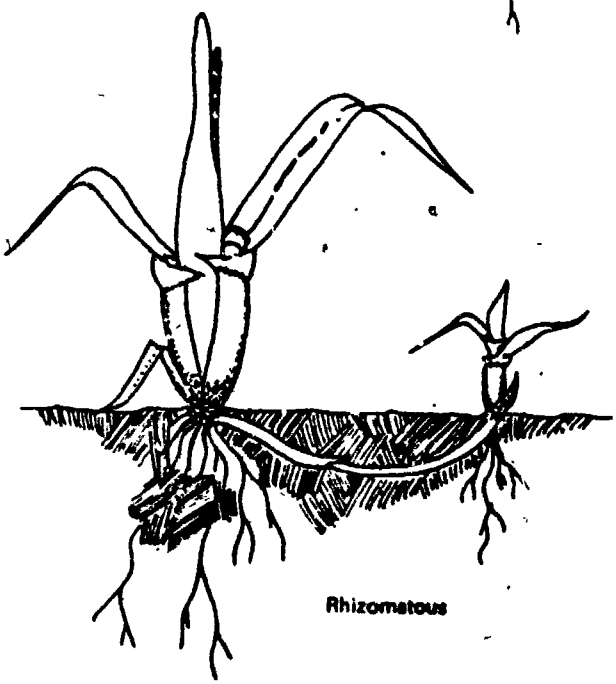


Turgeon, A. J. Turfgrass Management. Reston, VA: Reston Publishing Company, Inc., 1980.

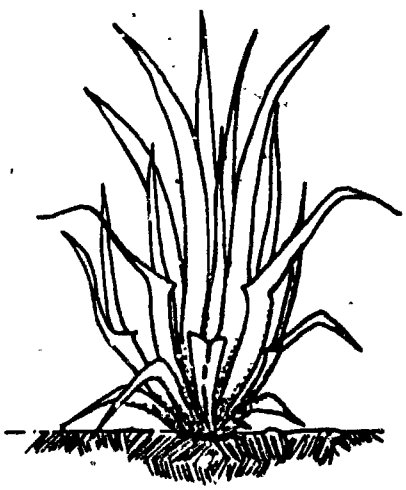
GROWTH HABIT



Stoloniferous



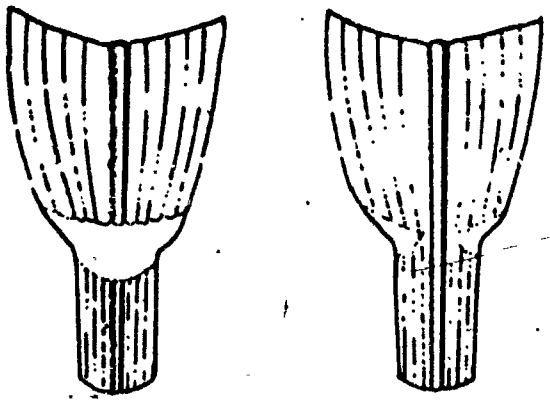
Rhizomatous



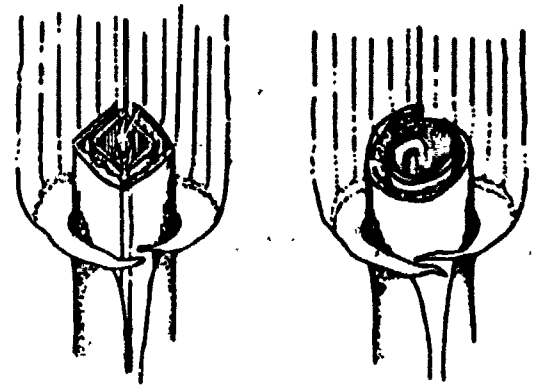
Bunch-type

Turgeon, A. J. and Floyd Giles. Turfgrasses of Illinois. Urbana, IL: Cooperative Extension Service, 1975. Circular 1105.

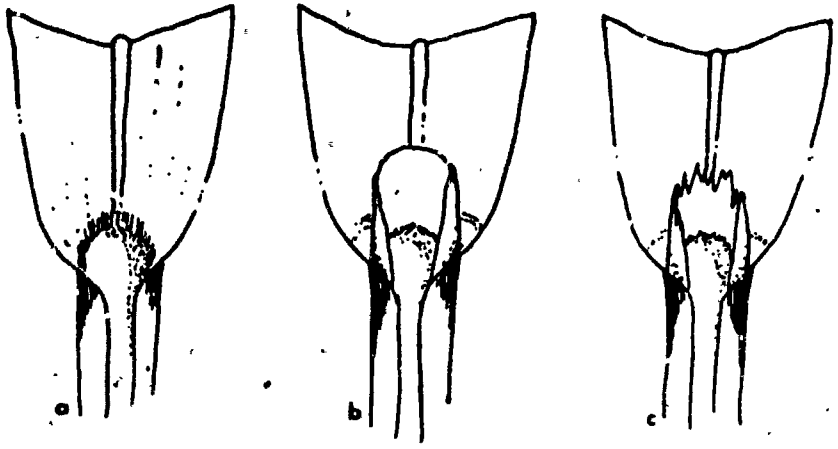
LEAF STRUCTURES



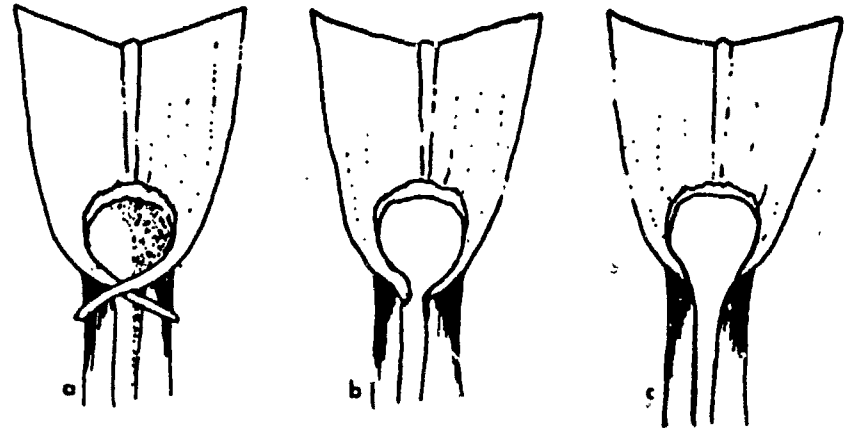
Continuous collar (left) and divided collar (right).



Folded (left) and rolled (right) vernation.



Ligule structures: (a) fringe of hairs, (b) smooth membrane, and (c) jagged membrane.



Turfgrass leaves with (a) long and slender auricles, (b) short and blunt auricles, and (c) no auricles.

IDENTIFY TURFGRASSES

Student Score Card

Identify turfgrass morphological features:

1. Where is the leaf sheath?
2. Describe the leaf blade
3. Is there a ligule?
4. Is there a pair of auricles present?
5. Does this turf have rhizomes?
6. Does this turf have stolons?
7. Where is the collar located?
8. What kind of turfgrasses have you identified?

IDENTIFY TURFGRASSES

General Discussion Activity

The first client is a homeowner. Mr. Smith has a primarily sunny lawn and is willing to supply any supplemental irrigation or fertilization to his lawn.

The second client, Mr. Brown, is also a homeowner. Since he works three jobs, he will be unable to do much except infrequent mowing. He has both sunny and shady areas in his yard.

Mr. Jones, wishes to seed in a playground as well as a large open area. Both will be maintained at a low level of intensity.

Another client, Mrs. McBride, is having trouble growing turf on the north side of her condominium.

A builder has a house he wants to sell as quickly as possible. He would like a green lawn and fast!

Mrs. Rockerfeller, who is quite wealthy, wishes to install a small putting green in her estate. She has several maintenance people who will give the green as much care as needed.

Discussion: For each of the above six (6) individuals:

1. List the turf(s) which is most suitable for that site specification. List both scientific and common name.

2. Think about what additional information is needed to make the best possible judgement--put this in question form.

3. For each turf recommended, list the cultural requirements of that specific turf.

No.1- Mr. Smith

Turf:

Questions:

Cultural requirements:

No. 2 - Mr. Brown

No. 3 - Mr. Jones

No. 4 - Mrs. McBride

No. 5 - Home builder

No. 6 - Mrs. Rockerfeller

IDENTIFY TURFGRASSES

Turfgrass Field Trip

1. Arrange a field trip to a specialized area of turfgrasses
   a. a university's turfgrass plots
   b. a sod farm
   c. a golf course
2. Discussion questions
   a. What was learned from the field trip experiences about turfgrasses?
   b. What comparisons can be made among the different professions dealing with turfgrasses?

IDENTIFY TURFGRASSES

Crossword

Down

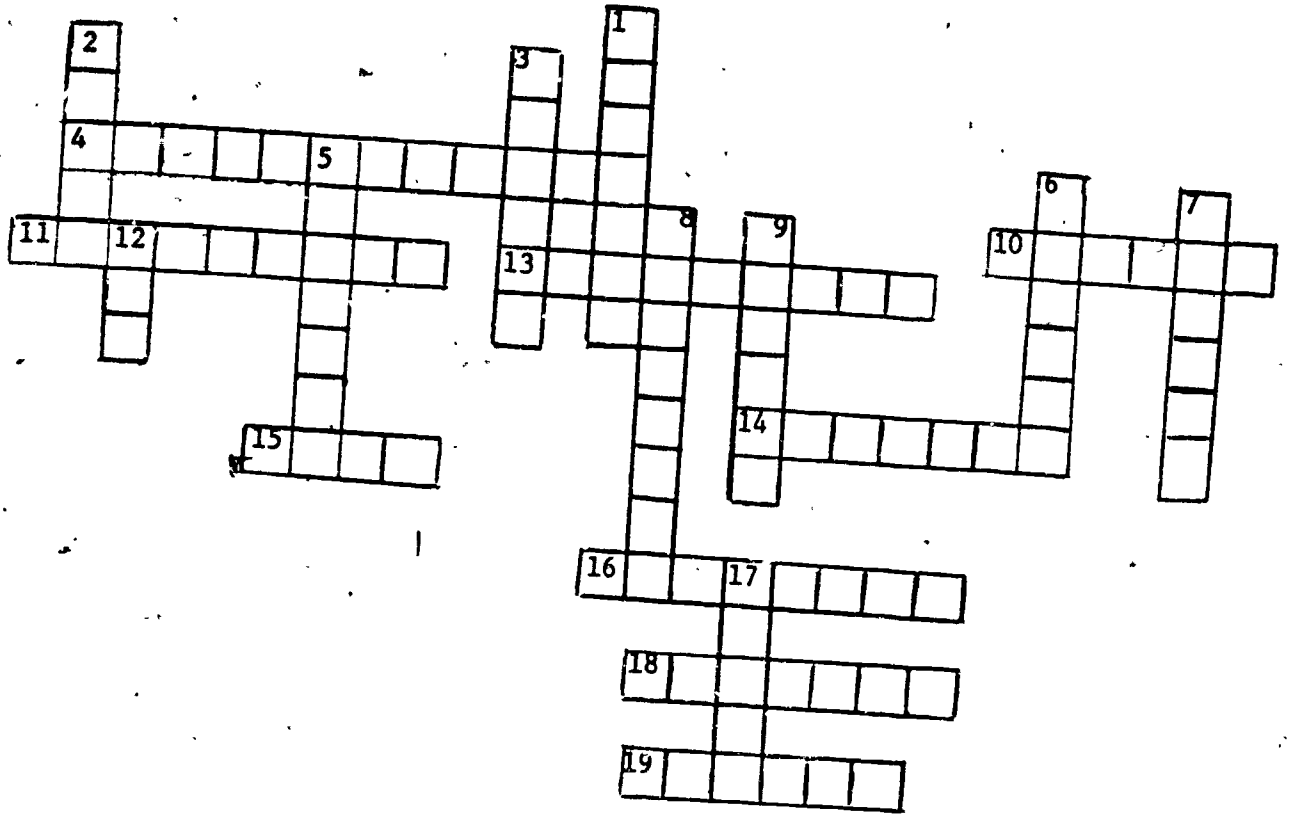
1. Several leaves usually arising from the center of a plant or near the soil surface
2. Inflorescence with flowers attached directly to an unbranched stem
3. A specie of bluegrass which reseeds itself each year
5. An underground stem modified for food storage and asexual reproduction
6. A membranous or hairy projection at the top of the sheath on a grass plant
7. A newly developed turfgrass shoot
8. A specie of bluegrass commonly found in the midwest
9. A plant that completes its life cycle, from germination to seeding, in one year.
12. A particular specie of fescue found in the midwest
17. Small, chaffy bract on a grass spikelet

Across

4. The entire group of flowers on a plant
10. The central vein of a leaf
11. A plant that lives more than two years
13. Leaves borne singly at regular intervals; not opposite
14. Claw-like appendage; extension of grass collar
15. A vascular bundle in plant terminology
16. A major type of turfgrass used in the midwest
18. A piece of equipment used to remove plugs of turfgrass
19. The lower part of the grass plant leaf, usually enclosing the stem

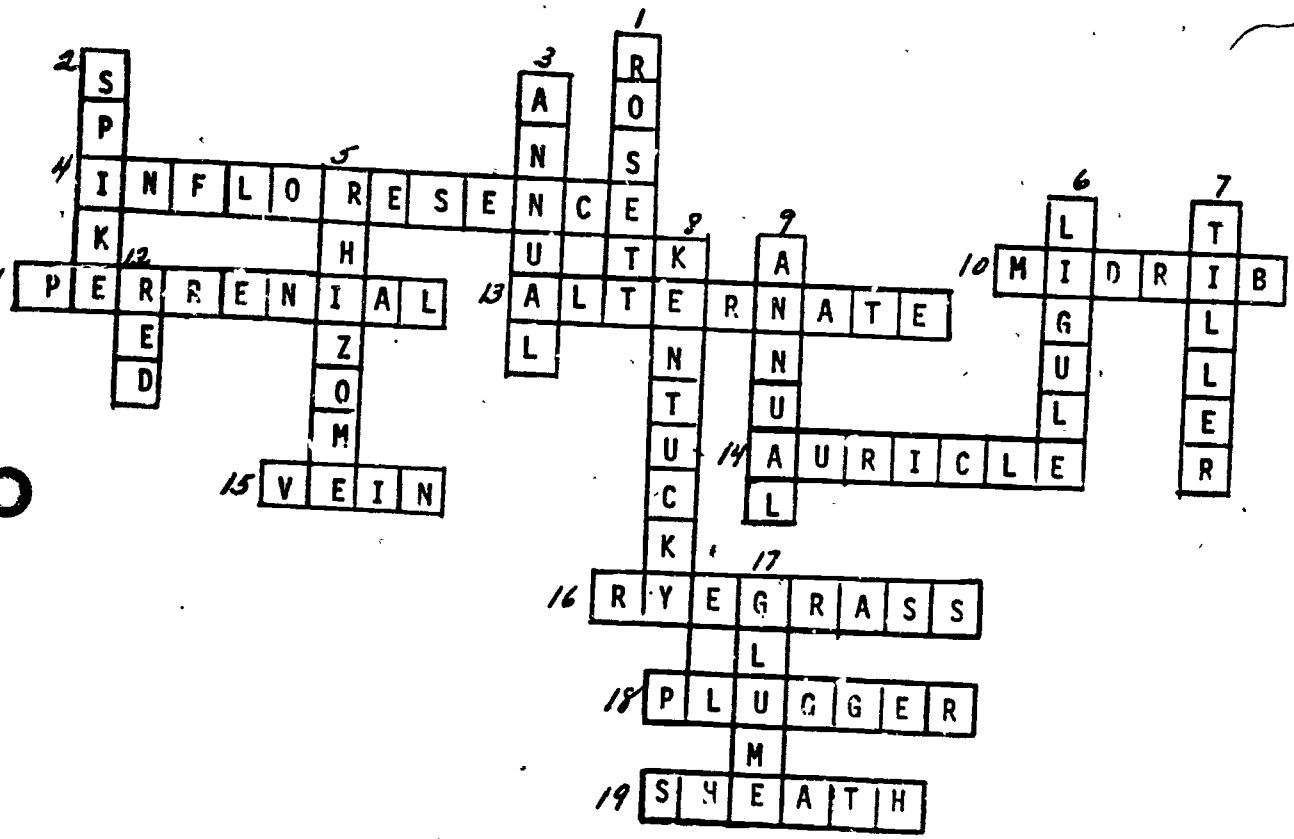
IDENTIFY TURFGRASSES

Crossword



IDENTIFY TURFGRASSES

Crossword Key



Suggestions for use:

Let students work individually
Let students work in pairs
Allow students to use their notes
Allow students to do as much as they can before using notes

IDENTIFY TURFGRASSES

Quiz

FILL IN THE BLANK

1. An underground horizontal stem which develops shoots or roots at any node is a (rhizome).

2. When two leaves or buds are arranged on opposite sides of a node, the leaf arrangement is referred to as (opposite).

3. An (annual) plant completes its life cycle, from germination to seeding, in one year.

4. An (auricle) is a claw-like appendage; extension of the grass plant collar.

5. The (inflorescence) is the entire group of flowers on a plant.

TRUE-FALSE

F 1. Annual fescue is the most common species of fescue found in the midwest.

F 2. A stolon is an underground stem modified for food storage and asexual reproduction.

T 3. Zoysiagrass is one of the six major types of turfgrass used in the midwest.

T 4. A rosette leaf arrangement is one where several leaves arise from the center of a plant at or near the soil surface.

T 5. The bluegrass leaves are keel-shaped.

MATCHING

A. Midrib	F. Sheath
B. Glume	G. Spike
C. Alternate	H. Perennial
D. Leaflet	I. Node
E. Panicle	J. Axil

C 1. Leaves borne singly at regular intervals; not opposite.

B 2. Small chaffy bract on a grass spikelet.

D 3. Blade of a compound leaf.

A 4. Central vein of a leaf.

E 5. Loose, irregular, and branched inflorescense.

F 6. Lower part of a leaf usually enclosing the stem.

G 7. Inflorescence with flowers attached directly to an unbranched stem.

H 8. A plant that lives more than two years.

I 9. The place where one or more leaves attach to the stem.

J 10. Upper angle between leaf and stem.

IDENTIFY TURFGRASS

Quiz

MATCHING

C	1. auricles	A.	tube encircling stem
G	2. collar	B.	tongue-like outgrowth
A	3. leaf sheath	C.	clasping appendages
F	4. leaf blade	D.	underground, horizontal stem
B	5. ligule	E.	aboveground, horizontal stem
D	6. rhizome	F.	flattened green portion
E	7. stolon	G.	junction between sheath and blade

LISTING

List the five turfgrasses best adapted for cool season conditions by writing both scientific and common name.

8. Poa pratensis - Kentucky bluegrass
9. Lolium perenne - perennial ryegrass
10. Agrostis palustris - creeping bentgrass
11. red fescue - Festuca rubra
12. tall fescue - Festuca arundinacea

List three site specifications which must be considered when selecting a turfgrass.

13. light
14. soil
15. fertilization

    mowing height

    irrigation